

Commonwealth of Kentucky
Division for Air Quality
PERMIT STATEMENT OF BASIS

Title V (proposed) No. V-99-012
Free-Flow Packaging International, Incorporated
500 Krusteez Way
Hopkinsville, Kentucky 42240

May 05, 1999
Sreenivas Kesaraju, Reviewer
Plant I.D. # 072-0700-0099
Application Log #: G041

SOURCE DESCRIPTION:

Free-Flow Packaging International, Incorporated produces foamed polyethylene sheets for packaging. Polyethylene along with isobutane, ethane, glycerol monostearate is used as the raw materials and is injected into the extruder. The extruded foamed polyethylene sheets go through the slit tube and winder. The wound foamed polyethylene sheets are stored in the warehouse. The bad sheets (Approximately 8%) are reprocessed to get a polyethylene resin. The major emissions from this process are VOC (Isobutane) emissions. There also are isobutane and ethane tanks. The isobutane tanks are pressurized tanks. The ethane tanks are tube trailers and are not filled on-site. They are replaced as needed.

COMMENTS:

Emission Point 01:

The emissions from extrusion process are Isobutane, which is used as a blowing agent along with ethane. Isobutane is a VOC and not a HAP. The company has a similar plant in Fulton County, Georgia where they have tested for isobutane emissions at the extrusion process. The emissions are 0.51 lb/lb of isobutane used. However, the permit requires the company to do the testing at this source within six months of startup of the process. There are no applicable regulations for this affected facility.

Emission Point 02:

The emissions from Foam Reprocessing are Isobutane. The emissions are assumed to be 100% of the residual isobutane existing in reprocessed material. There are no applicable regulations for this affected facility.

Emission Point 03:

The emissions from Foam Warehouse storage are Isobutane. The residual isobutane existing in the final product escapes during the storage process. Testing at their Fulton County, Georgia facility shows the emissions are 0.1 lb/lb of residual Isobutane in the final product. However, the permit requires the company to do the testing at this source within six months of startup of the process. There are no applicable regulations for this affected facility.

EMISSION AND OPERATING CAPS DESCRIPTION:

Free-Flow Packaging International, Incorporated is a new facility. This construction is permitted so as to limit the emissions of VOC's to 245 TPY and thus preclude the applicability of 401 KAR 51:017, Prevention of Significant Deterioration. The emissions of VOC's from all the affected units are directly related to the quantity of Isobutane used. The permit requires monthly monitoring and record keeping of Isobutane usage. The permit also requires the monthly and annual VOC calculations.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or record keeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has not incorporated these provisions in its air quality regulations.

COMMENTS DURING THE PUBLIC COMMENT PERIOD:

Public notice was placed in **Kentucky New Era** on March 26, 1999. One comment was received from Continental Mills (Attached), a flour-based food manufacturing facility. Continental Mills (CML) is located approximately 600 meters from Free-Flow Packaging International, Incorporated (FPI) in the same industrial park. CML requested a public hearing based upon the information they obtained about isobutane and its effects on their product and personnel. There were no comments from State of Indiana or from U.S. EPA during their concurrent 45 day comment period.

Since there were no other comments or hearing requests, Division for Air Quality (Division) has worked directly with CML to address their concerns rather than grant a hearing. CML toured an FPI plant in Atlanta and discussed their issues with FPI directly. The division modeled emissions from the proposed FPI and concluded that while pollutant (isobutane) concentrations were within NIOSH limits (discussed below), the vertical release of pollutants instead of via wall vents would reduce odor potential. The permit was modified to require FPI to vent the emissions at the roof height or more. The division received an additional request from CML regarding notification of any process or emission changes at FPI. The division committed to do this notification and modified the permit to ensure it is notified of changes that might affect emission and odor potentials. The comments are discussed below:

Comment 1:

Isobutane is stated to have acute health hazards to the respiratory system and chronic health hazards to the control nervous system. This raises serious concerns for the health and well being of our employees.

Response:

The division modeled the Isobutane emissions with the EPA TSCREEN model. The modeling was run for following scenarios:

a.) Isobutane emitted from a horizontal stack as proposed by the source.

- b.) Isobutane emitted from a horizontal stack with no upward buoyancy (Vertically Restricted) and assuming a dense gas release
- c.) Isobutane is emitted from the vertical stack with height equal to the roof height and with a exit velocity of 5000 ACFM.

Each scenario was run for both the Rural and Urban options and the worst case scenario for 15 minute, 30 minute, 1-hour, 3-hour, and 8-hour average time.

The modeling parameters used were 1.) Isobutane is denser than air, 2.) The temperature of the gas release is equal to ambient temperature.

Scenario b.) for the rural option gave the greatest effect. The maximum ground level concentration (one hour averaging period) was 12,660 $\mu\text{g}/\text{m}^3$ or 12.66 mg/m^3 (0.54 % of Maximum Occupational Exposure Limit (MAK) and 0.67% of Recommended Exposure Level (REL)) at the fence line. For the scenario b.) The maximum ground level concentrations were 16.7, 12.66, 12.66, 11.4, 8.9 mg/m^3 for 15 minute, 30 minute, 1-hour, 3-hour, and 8-hour average times respectively at the fence line. According to the NIOSH, International Chemical Safety Cards (Submitted by CML), the MAK is 2350 mg/m^3 (1000 ppm) and NIOSH REL is 1900 mg/m^3 (800 ppm). The maximum ground level concentration at the fence line at no time exceeded the exposure limits (MAK and REL) given for Isobutane. The 15-minute average exposure from the modeling of 16.7 mg/m^3 (0.71% of MAK and 0.88% of REL) can be used as a worst case as instantaneous monitoring is not available or feasible. Also, as described initially the Division has put a permit restriction requiring FPI to release the emissions at least at the roof level or higher (Scenario c.) to control odor problem. For the scenario c.) The maximum ground level concentrations further dropped to 4.03, 3.06, 3.06, 2.8, 2.2 mg/m^3 for 15 minute, 30 minute, 1-hour, 3-hour, and 8-hour average times respectively at the fence line.

The division believes based on the above modeling results that there will be no harmful exposure to the employees of CML at any time from Isobutane.

Comment 2:

Isobutane is a colorless gas with gasoline/natural gas odors. This raises a concern that our flour-based products readily absorb odors in our manufacturing process and our stored finished goods.

Response:

Isobutane as described above, has a gasoline/natural gas odor. A reference from Verschuieren's Handbook of Environmental Data on Organic Chemicals provided by CML indicates that Isobutane has an odor threshold (OT) of 1.2 ppm, and 1370 mg/m^3 for recognition.

Based on the modeling performed (Scenario b.), the maximum ground level concentrations at the fence line are 12.66 mg/m^3 (5.35 ppm). This concentration is greater than the odor threshold but far below the value for odor recognition (1370 mg/m^3). The odor threshold number was used to estimate the level of odor control necessary to protect CML's products. This leads to a very conservative assumption since all the Isobutane present is not absorbed into the flour and the odor threshold is not equal to the taste threshold. Modeling was performed (Scenario c.) assuming that Isobutane was released to the atmosphere at least at the roof height (30 ft). In this case the maximum ground level concentrations dropped to 1.29 ppm.

In light of the product concern and the results of the modeling using very conservative assumptions, a minimum height of release of 30 ft appears to be a very effective odor treatment strategy. The permit has been modified to require FPI to release Isobutane at least at the roof height (30 ft). Without more information on the effect of Isobutane on flour, the division is comfortable with this conservative approach.

Comment 3:

Isobutane is heavier than air and will migrate along the ground surface and reside in low lying areas. This presents two major concerns when the gas is concentrated in low areas. The high flammability index represents an explosive environment. The high concentration exposes personnel working in that area to the known acute and chronic effects of the gas.

Response:

As addressed in Comment 2, FPI is required by the permit to release Isobutane at least at roof height (30 ft). This will require some kind of mechanical exhaust fan causing greater gas dispersion. The modeling (Scenario c.) has shown that the worst ground level concentrations at this release height will be 1.29 ppm (0.000129% by volume). NIOSH gives the Explosive Limits by percent volume of 1.8-8.5 and the Auto-ignition temperature of 460 deg. Centigrade. Assuming that 100% of the isobutane at the fence line is going to travel into CML's building, the building is ventilated and the isobutane coming into the building is in equilibrium with the gas going out, the maximum percentage of isobutane in the inside air in CML's building is 0.000129% by volume which is less than the lower explosive limit of 1.8%. For the isobutane to reach the volume percent of 1.8, the concentration of isobutane in the building has to reach 18000 ppm, which is not possible, as the concentration of the isobutane at the fence line is 1.29 ppm. An explosive environment is not a concern from the concentrations present at CML.

Comment 1 addresses the acute health affects.